



MAGAZINE

PRICE TWOPENCE

MAY 1959



The *I.C.I. Magazine* is published for the interest of all who work in I.C.I., and its contents are contributed largely by people in I.C.I. It is edited by Sir Richard Keane, Bt., and printed at The Kynoch Press, Birmingham, and is published every month by Imperial Chemical Industries Limited, Imperial Chemical House, Millbank, London, S.W.1. Phone: VICTORIA 4444. The editor is glad to consider articles for publication, and payment will be made for those accepted.

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FRONT COVER: *A married Zulu woman. What looks like a hat is really her hair made up with a mixture of clay and fibre. And the arrangement of her decorations conveys a message of love. (Photo by courtesy of A.E. & C.I. Head Office, Johannesburg.)*

OUR CONTRIBUTORS



John Cunningham is in Home Sales Control with Nobel Division. He joined the Company in 1954 after graduating from Glasgow University and national service with the R.A.F.



David Lessels has been a member of the technical service staff of Paints Division since last July. Before then he spent five years after military service wandering across Africa. "I packed a rucksack," he says, "and set off on foot through Africa and back to satisfy a private wanderbug. I went from Cairo to Cape Town, back to Nairobi, then across the Congo to Nigeria, through the Sahara to Tunisia and finally home across Europe from Italy. The journey took five years and several pairs of boots. I earned my living in many ways—from shooting crocodiles to carrying stores with an Arab gang."



Robin Todhunter is now group director for Paints and Plastics. Before that he was Overseas Director for four years. He joined I.C.I. in 1927, had a distinguished career in the Navy during the war, and then became deputy Purchases Controller and subsequently Controller. Outside his work he has many interests—cricket, squash, golf, photography, sketching, choral singing and fast cars.

Explosives and South Africa

By the Editor

The story of the development of an explosively bound up both with the turbulent huge wealth won from gold and diamonds, pioneering flavour, recalling great names and drawn from hitherto unpublished

osives industry in South Africa is one in-
lent history of that country and with
monds. It is a story, too, with a strong
like President Kruger and Cecil Rhodes
records in the archives of A.E. & C.I.

AFRICAN Explosives and Chemical Industries Ltd.—commonly known as A.E. & C.I.—is a flourishing explosives and chemicals business of over £30m. a year turnover, owned jointly in equal shares by two giants of the industrial world—I.C.I. of England and De Beers Consolidated Mines of South Africa. It is a smooth partnership. De Beers are associated with the Anglo-American Corporation, one of the largest mining concerns in the world, and therefore keenly interested in the explosives and chemicals used in winning diamonds, gold, coal and copper; and I.C.I. makes available technical advice and direction.

Things were not always thus. Before 1914, when war fused old rivalries, competition in explosives was fierce in South Africa. The birth and early development of African explosives is a story intimately bound up with the turbulent history of South Africa itself, and the purpose of this article is largely to unfold that tale.

First, a few facts about South Africa. It is a land of many races. There are the descendants of the Dutch or Boers, who first came to the Cape as a staging post for the Dutch East India Company on its long journey to India. There are the descendants of the British, who established themselves at the Cape at the time of the Napoleonic Wars, thus triggering off eventually the Great Trek of the Boer farmers from the coastal plains into the hinterland, where they established in 1884 the South African Republic. There are the Asiatics (chiefly Indian) and the

coloured races of mixed blood, numbering today between them nearly 2 million. And lastly there are the Bantus or natives.

The story of A.E. & C.I. really begins with the efforts of the early South African Republic to stand on its own feet; and the members of the Republic remembered that they had in large measure established themselves in their new land in order to be independent of all external control. It needed no special political acumen to realise how important it was for independence not to rely on imported gunpowder and explosives carried in ships across seas controlled by Britain.

President Kruger's approach to the problem was to grant a monopoly of explosives manufacture to a chosen "concessionaire," who was permitted to be the sole importer of explosives until such time as local manufacture—which was the object of the concession—was established. There were in turn three such concessionaires, and all of them came from Central Europe.

The first, an Austrian called Nellmapius, honoured his contract by establishing a blackpowder factory near Pretoria. He was succeeded by a German named Edward Lippert (a cousin of Alfred Beit, who was one of Cecil Rhodes's chief collaborators). Lippert tied himself up with a French explosives company, making the gestures of local manufacture in that dynamite cases were filled in the Transvaal. For the rest, he preferred the easier profits of importation to the hazards of local manufacture.

This was not enough, however, to satisfy the President. As time went on, relations between the Boer Republic and the British colony at the Cape grew progressively worse; and with each crisis the urge for a full-scale local dynamite industry became greater. Moreover, this step was justifiable on purely commercial grounds, such was the huge demand for explosives from the immense diamond workings at Kimberley and the rapidly developing gold mines at Johannesburg.

Enter Nobels

In 1892 Lippert's five-year-old concession was cancelled.

A certain Dr. Gobert of Hamburg, concerning whom little is known, now appears on the scene. In 1894 this individual successfully brought together the French explosives company behind Lippert and various dynamite companies of the Nobel Trust. In fact, seven Nobel companies (five German, one French and one British) put up just under 50% of the capital, with the French company holding the next largest block of shares and the balance in the hands of Gobert and Lippert. The new company wasted no time in getting down to business. A large site was acquired at Modderfontein near Johannesburg and the Modderfontein Dynamite Factory was built there, today the largest explosives factory in the world.

It is interesting to look back on these early days. The manager was a German called Hoenig, who had every sort of difficulty to contend with. We find him conducting correspondence in his own hand in German, French, Dutch, Italian and English, although his English, judged from surviving specimens, was distinctly shaky. Decisions down to the smallest detail seem to have rested with the manager. "At long last the German carpenters reached Modderfontein yesterday," Hoenig writes. "Arranged to send a cart to the station which we were unable to do because the only useable horse was required elsewhere. This caused a bit of irritation among the newcomers, who had to be pacified after their long four-mile walk."

Pioneering Days

Another of Hoenig's letters orders "1 tin of plaster of Paris, 1 tin of fever mixture for Europeans, 1 ditto for Kaffirs, 1 laxative mixture for Europeans, 1 ditto for Kaffirs. . . ." One wonders who got the stronger dose! A further source of worry for Hoenig was friction with neighbouring Boer farmers. He wrote



South Africa in 1899, showing the boundaries between the British Colony and the Boer South African Republic

fiercely to one farmer: "We wish you to know that our officials are entitled to shoot anybody who in any way molests them." It is all rather like a Western film.

In fact, Hoenig was Modderfontein's dictator, and his word seems to have been law. Even marriage between employees dwelt on his blessing. There is a document which reads: "The undersigned general Manager certifies that . . . Michele . . . and Celestine . . . have obeyed themselves well and have never been punished. These persons are intending to enter into

marriage with each other and this certificate is issued to them so that they may carry it out."

Eventually, in 1896, came the great day of the factory's opening. President Kruger arrived in a special train; and there is a delightful picture of the President inspecting the guard of honour.

But all was not to be plain sailing for Modderfontein. First there was the tragedy of a tremendous explosion in a railway siding in the heart of Johannesburg, killing 70 people and destroying a lot of houses.



President Kruger about to inspect the guard of honour at the opening of Modderfontein Dynamite Factory near Johannesburg in 1896

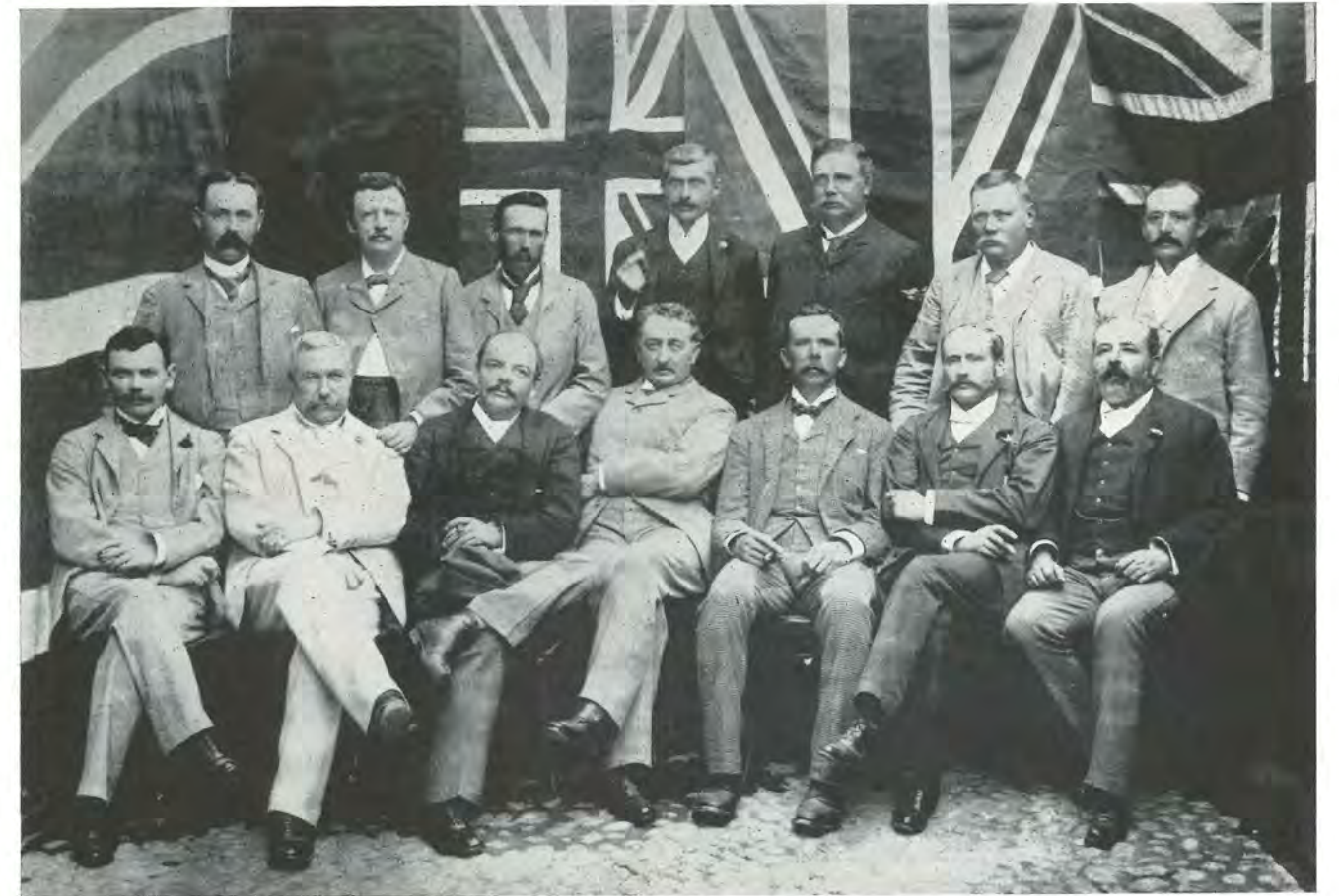
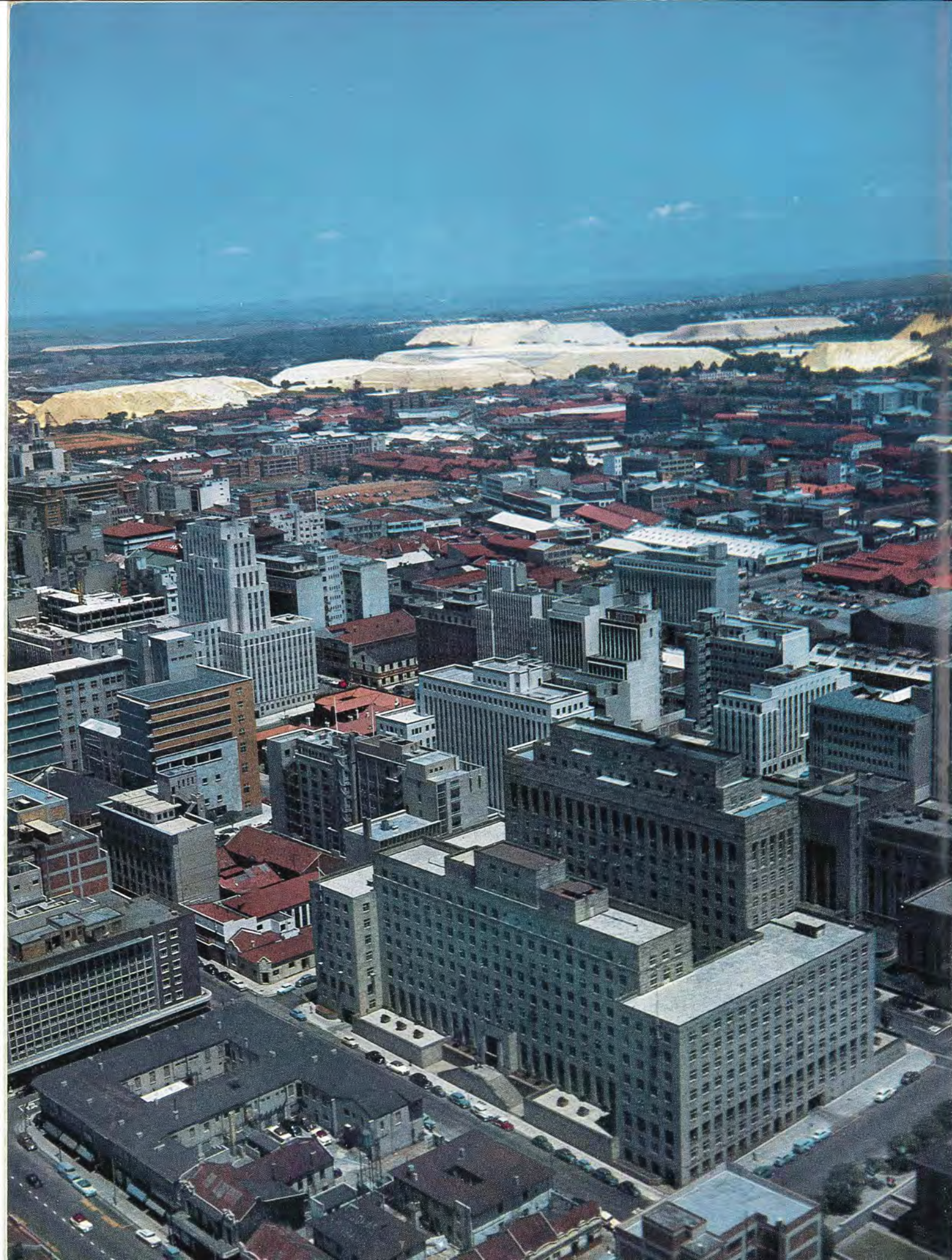
But more lasting in effect was the opposition aroused by the high prices of Modderfontein dynamite. So serious was the discrepancy between Modderfontein prices and world prices that the wrath of the mine owners led by Cecil Rhodes—they were known as Uitlanders (meaning foreigners), and they possessed no civic rights within the South African Republic—was fiercely aroused.

Eventually a special commission was appointed to take evidence. This commission estimated Modderfontein's profits at £2 per case or over £½m. in two years—a return of 50% on capital. Moreover, evidence was produced that dynamite could be imported at around 50s. a case as against the figure of close on £5 a case for Modderfontein dynamite.

These figures clinched matters in the minds of Cecil Rhodes and his collaborators. The De Beers directors decided to set up their own explosives

factory at the Cape; and Rhodes, chairman of De Beers, directed that the best possible man be got to run the new enterprise.

The best possible man turned out to be W. R. Quinan of San Francisco, at one time a colonel in the United States Army and then a Works Manager with the California Powder Works. What an outstanding man he was! His letter in which he accepted De Beers' offer and set out the problems as he saw them ends with the words "This letter has already reached extraordinary length. I keep a copy." "Extraordinary length" was no exaggeration. The letter runs to approximately 2000 words in Quinan's own hand. In it he set out with remarkable prescience and wisdom the lines which the new enterprise should take; and from approximately 10,000 miles away in California Quinan proceeded to direct the planning of the project and to insist on a new site being chosen closer to Cape



The De Beers Directors of 1893. Cecil Rhodes, the chairman, is seated in the middle of the front row and on his right is Dr. Jameson, his close friend and the instigator and leader of the famous Jameson Raid. Rhodes was Premier of Cape Colony at this time.

Town harbour. This decision was the beginning of the Somerset West explosives factory of De Beers, a factory which Rhodes insisted should not be skimmed. He ordered that the best materials should be used in its building, and Herbert Baker, later to become famous as the man who created New Delhi, was appointed architect.

However, in spite of Quinan's businesslike approach there were long delays. Quinan had hardly landed with his family at the Cape before the Boer War broke out. The extraordinary situation then arose that Quinan was directing operations while his chief, Cecil Rhodes, keenly interested in every detail of the project, was besieged by Boer forces at his Kimberley mines. The two men contrived nevertheless to communicate. We find Quinan making the appointment of an agent in California and writing: "Mr. Rhodes, chairman of De Beers, is besieged in Kimberley but has sent instructions by despatch runner..."

This sort of thing was perhaps the least of Quinan's

difficulties. Obstruction by the Cape Government, where Rhodes had resigned as Prime Minister after the Jameson Raid and where his influence was in consequence low, led to protracted negotiations before even a licence to make explosives at the Somerset West site could be obtained. In fact, it was not until 1903 that Somerset West began production; and the all-important licence reached Quinan ten days after the first charge of nitroglycerine had been made.

Our story now moves forward to 1907. In that year Arthur Chamberlain, brother of Joe Chamberlain (the father of Neville and Austen and Colonial Secretary at the time of the Boer War), journeyed to South Africa. He came in his capacity as chairman of Kynoch's, whose interest in South Africa dates back to the '80s, when George Kynoch visited President Kruger and secured for his firm the title of "Armourer to the Republic."

What use Kynoch made of this concession to supply munitions has never been revealed. There is no public

(Continued on page 159)

Johannesburg today. The big building in the foreground is the office block of the Anglo-American Corporation with whom De Beers are associated. A.E. & C.I. also have their offices here. In the far distance can be seen the outcrop thrown up by the workings of the gold mines. Modderfontein Dynamite Factory is some twelve miles away to the left of the picture.

GEOFFREY WARD

By Denzil Batchelor



IT all depends on the way you look at it. From one point of view (his own) lawn tennis has enriched Geoffrey Ward's life with a blazon of good fortune; yet from the standpoint of an impartial critic it could be said that Ward might claim that his sporting career has been blighted by bad luck. He is 31 now; was good enough to take K. Nielson, twice a finalist, to five sets and sixty games at Wimbledon last summer; was ranked tenth in Britain in 1955; has captained England (always victoriously) in international matches against Wales, Scotland and Ireland; has won seventeen out of eighteen singles and doubles in Gregory Cup contests against the Scandinavian countries.

These are notable achievements, but there is no saying what might have been scored up to Ward's credit if this tall, slim young man in the Treasurer's Department at I.C.I.'s Head Office had been born a couple of years later. As things were, the war torpedoed his chances of rising to the very top.

He began at 10, inspired by the visits of his parents to the Derwent Club at Wood Green, a friendly club which went under during the war and never had more than two courts on a slope almost as bad as Tattenham Corner or the Norwich City football ground. Thence he passed to the Vicars Moor Club at Winchmore Hill, which took great pains with its juniors and saw to it that young Ward entered his first competition, an Under-16 tournament of the Junior Lawn Tennis Club of Great Britain at Queen's. Here he was only beaten by the ultimate winner with the score at 5-7 in the final set in the first round. There was no senior competitive lawn tennis in Britain at this time, because of the war: Ward had to content himself with winning several under-18 tournaments and earning the right to coaching by Dan Maskell.

This became his due at the age of 18; but he was 21 before he got it. Because of the war he spent the intervening years, the most important in a budding tennis player's career, virtually without ever having a racket in his hand. Therein, in the opinion of this impartial critic,

Geoffrey Ward ran into all the bad luck necessary to keep him from the peaks and the pinnacles. He learned a lot when at last Maskell went to work on him. His small-time experience in junior lawn tennis had not taught him the necessity for a really good second service, and his volleying was rather weak. He improved in both these departments—but too late.

The plain fact was he had never seen a good tennis player in action until he visited his first Wimbledon in 1948. He thus missed seeing Kramer win the singles. Today he considers Kramer the best player he ever watched ("I've only seen the incomparable Gonzales on wood," he adds); and picks Sedgman—"He had the quickest reactions of them all"—as his second choice. It's always hard to settle on the top singles player, but Ward has no doubt about his supreme doubles pair. They were Sedgman and McGregor: "They had everything a pair needs, including perfect teamwork."

This brings us to a point of particular interest and perplexity: the question of how the champions of forty and fifty years back would compare with the past-masters of today. By the form book it is arguable that H. L. Doherty was as good as Brookes, who was as good as Tilden—who was as good as anyone. Note, please, that all the leading players of the age of Doherty and Brookes were lily-white amateurs.

Ward's comments are enlightening. "There were a lot of wealthy people in those days," is his first footnote. Next, he does not dispute the ability of the players of the past but points out that in their day they had a much smaller field of competition. "Today every country in the world sends its best to Wimbledon, and to win there you have to have stamina and nervous stability to last you through a fortnight *with no rest period against 'rabbits'*." He does not suggest that the earlier champions would have lacked these qualities. He merely points out that they would have had to develop them.

Ward emphasises another aspect of the enquiry into the status of the past. Critics are perpetually extolling the phenomenal *control* of the earlier champions; but it must not be forgotten that they were playing with the old-fashioned stitched ball, which helped this quality much more effectively than the modern ball manufactured to make for faster tennis.

We are always hearing that first-class lawn tennis players today are disguised professionals to a superman. Of those in the very top class this is unquestionably true, but Ward himself is one of the vast majority who have never received more than bare expenses, which in fact can never have covered the necessities of life during his tournament career. Since he left India and the army in 1948 he has stuck to his job as an accountant and only found time for two long holidays—of three months each, one in Britain and one in the south of France—during



which he was able to devote himself to his game.

Geoffrey Ward looks forward to the time when lawn tennis offers an open championship, as golf does. "It's only logical that it should have one," he submits. "And it's bound to come." All the same, he recognises that this solution is not without its problems. One of these is that tennis throughout Britain is run by a large, dedicated body of volunteer organisers who would not give their services to a game which reached its climax in an open tournament milched of most of its profits by the chief professional players.

Meanwhile he thinks the national future is bright, despite the fact that "unlike the Australians, we have to contend not only with our winter but also with our summer." The loss of the leading Australian players to the Kramer circus makes the Davis Cup much more open. It is not impossible that our turn is near at hand for the first time since the Perry-Austin era: "Anyway, we should be good enough to beat Italy on grass in England this summer."

It is—though the thought is mine, not Ward's—imperative, if we are to make our mark among the great tennis nations, that our finest players should never lose a chance of competing against the world's best whenever the opportunity offers. Last year, you may remember, one or two of them went out "into the sticks" after a cheap cup in Malvern when the real pre-Wimbledon challenge was to be met at Queen's. *Per ardua ad astra*—it's a tough road to the top: it takes character as well as natural ability. Oh, how I wish that Geoffrey Ward were three or four years younger!

People and events . . .

Billingham on show to its Biggest Party

BILLINGHAM Division entertained its biggest-ever party of visitors on 21st April, when over 400 of the Company's fertilizer agents from all parts of England and Wales spent the day touring the works.

They were shown the latest developments in fertilizer manufacturing plant, including the new Concentrated Complete Fertilizer granulation process and its associated storage silo and modern packing shed, which came into operation last autumn.

Other sections visited included the plant making the new fertilizer 'Kay-Nitro,' the sulphate of ammonia process and storage silo (the biggest at Billingham), and the 'Nitro-Chalk' plant. The agents also saw the compression and carbon dioxide removal sections of the main ammonia process, the key to Billingham Division's whole production organisation.

The visitors travelled to Billingham by special train which entered the factory site near the East Gate—the first time that a passenger train has ever been inside the works fence. On arrival they were met by a fleet of motor coaches, in which they toured the site during the morning and afternoon.

Between the tours the visitors were taken to the Synthonia Club before luncheon, and many of them had an opportunity of talking informally to **Sir Alexander Fleck**, Chairman of I.C.I., and to members of the Main and Division Boards.

* * *

Luncheon was served in the staff canteen, and special alternative arrangements were made for members of staff who normally use this canteen. These included an extension of the normal lunch break and the provision of buses, at the Company's expense, to take staff to and from their homes.

After luncheon the visitors heard speeches by Sir Alexander Fleck and by Col. J. F. Cramphorn, president of the National Association of Corn and Agricultural Merchants. The speakers were introduced by **Mr. W. J. V. Ward**, Billingham Division chairman.

At the end of a busy day the agents returned by special train to Scarborough, where an informal dinner was held in the Royal Hotel under the chairmanship of **Mr. J. W. Kerr**, Commercial Managing Director, Billingham Division. The toast "The Continuing Partnership" was proposed by Mr. N. B. Ellis, vice-president of the National Association of Corn and Agricultural Merchants, and replied to by **Mr. W. D. Scott**, Group C Director on the I.C.I. Main Board.

What the Papers Said

THE Company's accounts for 1958 (we publish a simplified version on page 166) and the declared dividend of 8%, which is the same as a year ago allowing for the one-for-two scrip issue, was widely reported in the press. Here are some of the things they had to say.

The Sunday Times. The sharp fall in the earnings of Imperial Chemical Industries came as a bit of a shock, simply because the figures are a stark reminder that profit margins are not what they were a year ago. Conversely, some people may have overlooked the

fact that I.C.I.'s volume of business is as good as ever.

The Financial Times. The extent of the setback in I.C.I.'s profits comes as an unwelcome surprise.

The Star. I.C.I.'s story is a familiar one—sales maintained but profit margins cut.

Sunday Dispatch. Disappointing as Imperial Chemical Industries profits were, my advice is that you should on no account panic out of the shares at 34s. 1½d. I.C.I. will soon be back on the road of expansion, and the shares remain one of the most attractive long-term investments on stock markets.

'Terylene' Pilot Plant Closed

APRIL saw the end of 'Terylene' production at Hillhouse Factory. The 'Terylene' pioneer spinning plant has been closed down and the building is being taken over by Plastics Division as a store.

Plant scale production of 'Terylene' filament yarn began at Hillhouse in 1949, followed by staple fibre production in 1951. Early production problems were gradually overcome and markets for 'Terylene' developed, with Hillhouse playing its part as sole supplier of yarn until the first Wilton plant could be brought into production.

It was planned that once production was established at Wilton the pilot plant at Hillhouse should close down, but the market for 'Terylene' grew so rapidly that the original Wilton plant was from the start worked to capacity. So the spinning plant at Hillhouse was kept going to develop new types of 'Terylene.' The result has been that the Hillhouse plant has remained open for ten years and is only now transferring the processes for heavy-denier yarns—used for conveyor belts and ropes—to Wilton.

Of all the major developments which Hillhouse has undertaken these heavy-denier yarns are the last to have reached the marketing stage. Their success is stressed by the recent sale of five miles of 'Terylene' conveyor belting to Russia, announced in the March issue.

Award for Dutch Consultant

ARATHER special long service ceremony took place at I.C. House recently when **Mr. J. C. Swallow**, Plastics Division chairman, presented a gold watch to **Professor A. M. J. F. Michels** of Amsterdam University. It commemorates his association with I.C.I. as a consultant over the last thirty years.

Professor Michels is well known in the scientific world for his work in the field of high-pressure physics. He became a consultant of I.C.I. in 1928 and was responsible for the design and construction of the first laboratory compressor for compressing gases to 3000 atmospheres (a pressure of nearly 20 tons per square inch). It was with this machine that the first ton of polythene ever made in the world was produced by Alkali Division in 1938.

Over the last thirty years a number of people in I.C.I. have had the privilege of working in his laboratory in Holland. In making this presentation **Mr. Swallow** said it was a token of our appreciation of Professor Michels' contributions to I.C.I. over the years, of the friendship so many people in I.C.I. had for him, and finally as a recognition of him as a physicist of great repute.

Wallerscote Albion?

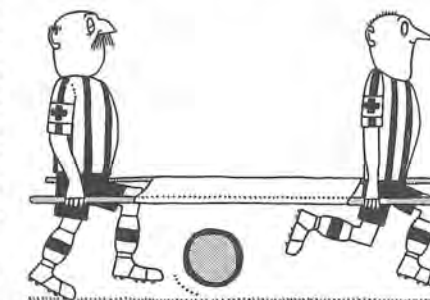
FROM Alkali Division, champion Division in the I.C.I. First Aid Competition, comes this amusing case of mistaken identity. It happened at Blackpool, scene of the Division's eliminating competition, and concerns the team from Wallerscote Works.

No one would have accused the team of over-confidence before they set out, and they were quite unprepared for the sort of remarks that were shouted at them by a crowd of locals as they alighted from their coach out-

side a Blackpool hotel the night before the contest.

"You've 'ad it!" cried one Black-pudlian. "Pack your bag!" added another. "Fancy yer chance?" jeered a third. Enough to daunt the stoutest heart.

Even when it transpired that they had been mistaken for West Bromwich footballers come to do battle with



the local team there were those who considered that Wallerscote began the morrow's tests at a definite psychological disadvantage.

* * *

Indian Showpiece

ON his recent visit to India when he accompanied Prince Philip, **Sir Alexander Fleck**, Chairman of I.C.I., visited the stupendous Bhakra Dam project on the River Sutlej which employs 50,000 people and will cost £50 million.



The £50 million Bhakra dam under construction

Statistics are often dull, but the sheer might of this undertaking cannot easily be otherwise conveyed. It will be 740 ft. high and 1700 ft. wide, and will contain 140 million cubic feet of concrete. It will hold back a third of a billion cubic feet of water in a lake 56 miles long, and this will be used first to generate 900 megawatts of electricity (as much as the largest power station in Britain) and then to irrigate 10 million acres of land, on which an extra million tons of food will be grown each year. Day and night concrete is being poured into the dam at the rate of 10 tons a minute. The concrete is refrigerated before pouring, and will have to be cooled for many years by circulating water through pipes embedded in the dam. To carry the water mains there are as many miles of galleries in the dam as there are corridors in I.C. House at Millbank—3½ miles.

The size of the dam is only matched by the immense difficulties of constructing it. The foundations are of crumbly sandstone with clay seams; to strengthen this it has been necessary to excavate to a depth of 190 ft. below the river bed and then to pour in concrete. The sides of the gorge have been consolidated by drilling holes in

them, washing out the clay seams, and injecting more concrete to bind the sandstone.

The whole project is being carried out by Indians with American advice. The chief consultant is a Mr. Slocum, a tough little man of 72 who has spent a lifetime building dams. He is paid more than any other man in India, and is said to ring up Mr. Nehru direct if the building programme is frustrated by unpunctual deliveries of materials.

Space Flight Specialist

MR. ARTHUR CROSS, a Technical Officer employed by Plastics Division at Winnington, soared into public prominence recently when he was featured in the B.B.C. television programme "Tonight" and also in an article in the *Daily Mail*.

As a Fellow of the Royal Astronomical Society and a member of the British Astronomical Association and the British Interplanetary Society, Mr. Cross has for years devoted his spare time to the study of astronomy and the possibilities of space exploration.

It was an article of his, "A Space Ship Flight Simulator," that appeared in a recent issue of *Aeronautics* that brought him into prominence outside the limited circle of serious students of space.

Mr. Cross's space flight simulator stands in a spare room of his home. It



has a cabin containing a control and instrument panel. At the side of the control panel is a revolving aluminium drum into which have been punched holes to represent the visible stars. When lit inside by a powerful lamp these stars are projected on to a wall

in correctly determined positions and size, so that the spaceman looking through the porthole has an accurate impression of the universe.

In this simulator, made from second-hand motors, Meccano, clock parts, war surplus instruments, and an old table and chair at a cost of £50, Mr. Cross is finding and mastering some of the complex problems of navigating a space ship in flight.

Mr. Cross's television appearance on 26th February was something of a whirlwind affair. He was contacted by the B.B.C. in the morning and agreed to appear in the evening. A van collected him and his simulator at 4.30 p.m., and he arrived at the studio at 5.45 p.m., leaving about three-quarters of an hour to set up the machine ready for the programme.

Gas Storage Underground

IN the December 1957 *Magazine* we reported that General Chemicals Division was co-operating with the Northern Gas Board to develop in the Cassel Works brinefield near Billingham a new method of storing gas underground in brine well cavities.

I.C.I.'s part in the experiment was to develop a cavity suitable for gas storage—the brine to be pumped out and used by Cassel Works as part of their normal operations. This is now complete. Meanwhile the Gas Board have constructed nearby a gas compression plant connected by pipeline to their trunk gas mains. The pumping of gas was started in February, and the first few weeks were taken up displacing brine which filled the cavity.

* * *

In a nutshell, the scheme is this. About 10 million cubic feet of gas is drawn from the trunk mains over the week-end when demand is low and stored underground under high pressure. During the weekday peak periods the gas is returned through a pressure-reducing system into the supply mains and so helps to smooth the weekly fluctuations in demand on the gas-producing plants in the area. Storing gas underground in this way is reckoned to cost only about one-

IN BRIEF

East German Order. The German Democratic Republic signed a contract to buy I.C.I. dyestuffs to the value of £100,000 at the Leipzig Trade Fair. The signing ceremony was shown on the East German television network.

Heysham's Million. The whole Heysham group recently completed one million hours without a lost time accident. Messages of congratulation were sent to I.C.I. Trimpell and Shell employees at Heysham by Sir Ewart Smith, Mr. W. J. V. Ward (Billingham Division chairman) and Mr. E. Le Q. Herbert (Managing Director of Shell Refining Co.).

Off to Germany. Billingham Synthonia junior soccer team has been invited to travel to Germany with the Durham Association of Boys' Clubs' team at Whitsun to take part in an annual knock-out competition. The National Association sponsors a county and a club team. This year it was Durham's turn, and Synthonia was chosen out of 86 boys' clubs in the county.

Health Service Post. Sir Ewart Smith, a former deputy chairman of I.C.I., has been made chairman of a new council, set up by the Ministry of Health, to assist the development of efficient techniques in the National Health Service.

Mr. W. M. Jones. It is announced with deep regret that Mr. W. M. Jones, Metals Division Labour Manager, died on 4th March after a short illness. He was 45.

Explosion at Billingham. As we go to press, the news has just reached us of an explosion on 21st April in part of the new oil-gasification plant now being commissioned at Billingham Factory. Three men were killed and eleven hurt. Two of the injured men were taken to hospital but were later discharged, and the rest were treated for minor injuries at the works ambulance centre. The causes of the accident are being investigated.

quarter of the money needed for similar capacity conventional gasholders.

It is the first man-made underground gasholder in Europe, and is stated to be large enough to store about half the total gas consumption of Middlesbrough on a peak day.

Worm's-eye View

WE don't plan to make a habit of publishing anonymous contributions, but we feel readers may enjoy this view from the bottom rung of the ladder:

"According to the last figures published, I.C.I. numbers 112,108 people, of whom no fewer than 112,107 are my bosses (or so it seems to me).

"I used to worry a lot about this at one time until I discovered that life on the outskirts has its compensations. It's a fairly safe job to start with. They can't downgrade me.

"Now, Sir Alexander Fleck occupies a position at the uppermost extremity of the same ladder; and we have certain things in common. Sir Alexander asserts that there is plenty of room at the top. I can assert with equal confidence that there is lots more room at the bottom.

"And another thing. Sir Alexander and I, equidistant as we are from the seething mass of mediocrity in the middle, are the only two on the payroll who can get a clear, uninterrupted view of the organisation as a whole. It's a comforting thought. Perhaps we could compare notes some time."

On Top of the World

Two Wilton engineers, both keen Alpine climbers, are setting their sights even higher this summer. Their goal is nothing less than some of the unclimbed peaks of the Himalayas. They are 26-year-old **Mr. John**



Edwards and 22-year-old **Mr. Harry Stephenson**. Last month they were among a team of five mountaineers and a scientist who sailed from Liverpool on the first lap of a 7000-mile journey to explore the mountains of the Batura Mustagh in the north-west Karakoram Himalaya, which contain some of the world's highest unclimbed peaks. Our picture above, taken on their last day at Wilton, shows Mr. Edwards (left) and Mr. Stephenson with

OTHERS

I.C.I. does not stand alone in the chemical industry. Other firms are both our customers and our competitors. Here are some of the names which have been in the news recently.

Imperial Smelting Corporation. Plans for the commercial production of nuclear grade raw beryllium are announced by this company. The new plant, which will be sited at Avonmouth, is scheduled to be in operation by the end of the year.

Unilever. The Unilever Organisation has formed a new company—the British Extracting Company (Sales)—to market a wide range of chemical products for the farmer.

Esso. A petroleum chemicals plant was opened recently by the Minister of Power at the Esso refinery at Fawley in Hampshire. The new extension into petrochemicals production has cost between £9m. and £10m. The two chief products are ethylene and butadiene.

Shell. Shell Chemical announces that it is proceeding with the construction of large-scale polyolefine manufacturing facilities at its factory at Carrington, Manchester. The first stage embraces the production of some 30,000 tons a year of polythenes and polypropylenes.

Albright and Wilson. The Albright and Wilson chemical group is launching a major expansion of its Canadian activities. New plants costing between £3½m. and £4m. are to be set up at New Maitland in Ontario to produce sulphuric and phosphoric acids, sodium phosphates and other products. Production should begin early in 1960.

Mr. C. Hunter, Construction Works Manager.

Much of the equipment the party is taking with them is made from I.C.I. products. It includes nylon rope, sleeping bags and tents, 'Melinex' waterproof covers, 'Terylene' marker flags and lightweight clothing, and 'Alkathene' bags and containers.

First "Dip.-Techs"

To Metals Division falls the honour of claiming the first two student apprentices in I.C.I. to be awarded the new Diploma in Technology. This is the qualification created three years ago by the Ministry of Education as part of the Government's drive to train more technologists to roughly university degree standard. Birmingham was one of the earliest colleges to obtain recognition of its Diploma in Technology courses and last month Metals Division's **Brian Harrison** and **David Hewston** were among the first group of students there to qualify for a Dip.-Tech. in metallurgy—the first such awards in the whole country.

I.C.I. now has 85 student apprentices and others taking Dip.-Tech. courses in various subjects. The courses are arranged on the "sandwich" basis. Students spend six months in each year at college studying for the Dip.-Tech. and the remaining half-year with their own Division

undergoing practical training complementary to their college studies.

Brian Harrison and **David Hewston** started their careers as lab assistants in the Research Department at Witton. Brian Harrison is currently president of the Guild of Students at Birmingham College of Technology.

Guess Where

OUR front cover last October seems to have been the subject of much speculation. **Mr. Seymour Brickman**, Plastics Division photographer who took the picture, tells us that he has had a number of enquiries about it, all from people who thought they recognised themselves among the four figures silhouetted against the sunset. The latest query reached the *Magazine* office a few days ago from a member of the staff of one



The October cover

of our dyestuffs customers who wanted to know if the photograph was taken at Oban in Scotland early in July 1957. The writer and her husband were on

honeymoon there at the time and thought they recognised themselves as the two people on the right of the picture. Earlier Mr. Brickman had received similar enquiries from Billingham and Warrington and from colleagues in Plastics Division and telephone calls from as far afield as Bangor, Bournemouth and Polperro. Where did Mr. Brickman take his very beautiful photograph? The answer is—Hampstead Heath.

The "Open Day" in Switzerland

At the end of the month a work study "open day" team will again be packing its bags and setting off for foreign parts. This time their destination is Zürich, where, sponsored by the British Chamber of Commerce for Switzerland, the I.C.I. team is to give two "open day" conferences to representatives of top Swiss management.

This time the team is being led by Sir Walter Worboys, I.C.I. Commercial Director. The other members



will be Mr. Russell Currie, Mr. J. B. Kitchen and Mr. P. J. Torrie, who all took part in the first overseas "open day" conferences held in the West Indies last July.

Indian 'Alkathene'

At Rishra, near Calcutta, India's first polythene plant was opened on 2nd May by Mr. Morarji Desai, the Indian Minister for Finance. The plant has been built by the Alkali and Chemical Corporation of India Ltd., an I.C.I. subsidiary. The whole project, including housing, roads and services, has cost just under £3m. It is estimated that it will save India well



Part of the new 'Alkathene' plant at Rishra, Calcutta

over £1m. every year in foreign exchange. The plant's licensed capacity is 3500 tons of 'Alkathene' a year.

A start-up party of technical experts and instructors from Plastics Division has been in India since February to assist and advise in the commissioning of the plant.

The name 'Alkathene' is already well known in India, for I.C.I. (India) has been making film from imported granules since 1952 and 'Alkathene' pipe since 1957. Shops and bazaars there are filled with 'Alkathene' goods of all types, from buckets and bottles to a great variety of colourful toys.

Nature's Power House

Mr. G. H. Wills of Pensions Department was recently out in Australia for four months, the major part of which he spent on a course at the new Australian Administrative Staff College at Mount Eliza, near Melbourne, of which I.C.I.A.N.Z. is one of the sponsoring companies. Also attending the same course were Mr. C. E. Dowling of I.C.I.(N.Z.) and Mr. R. J. Geary of BALM Paint Pty. Ltd. Before returning home Mr. Wills spent two weeks in New Zealand, and one of the places he visited was the famous thermal region around Rotorua in the North Island.

New Zealand is in the ironical position of having a wealth of potential hydroelectric sites in the South Island while most of her population and industry are in the North Island. The North Island's ever-increasing requirements of power have prompted the powers that be to explore every avenue. The interesting possibility of an underwater power cable between the two islands across the Cook Strait is being examined, and another hope lies in the scheme for tapping the enormous natural steam reserves of the thermal region on which New Zealand is planning to spend over £NZ20 million.

A pilot borehole in 1950 brought immediate success, and the resulting jets of steam came out with such a roar that they could be heard many miles away. To date some fifty bores have been drilled up to depths of over 3000 ft., and already a modest kilowattage is being generated and fed into the national grid. Mr. Wills' photograph on page 159 shows the scene of operations at the borehole area at Wairakei.

Any Questions?

"ALTHOUGH it is true that Adam and Eve didn't do themselves any good when Eve became curious about the apple tree, progress from the beginning of time has resulted from curiosity and the asking of questions."—From a Canadian Government publication, "Teamwork in Industry."

APPOINTMENTS

Some recent appointments in I.C.I. are: **Billingham Division:** Mr. R. D. Johnson, Assistant Accountant (in addition to Mr. H. T. Atkinson). **Dyestuffs Division:** Mr. J. Pearce, Chief Accountant; **General Chemicals Division:** Mr. A. A. Martin, Assistant Chief Engineer. **Paints Division:** Mr. P. F. Overbury, Home Sales Director. **Pharmaceuticals Division:** Mr. J. G. Fisher, Commercial Director. **Plastics Division:** Mr. A. R. Burgess, an Assistant Manager, Technical Department; Dr. J. W. C. Crawford, Research Manager; Dr. J. Gadsby, Manager of Technical Service and Development Department; Mr. H. J. Spencer-Palmer, an Assistant Research Manager. **The Regions:** Mr. T. H. Gallie, Regional Sales Manager, Metals Department, Midland Region. **I.C.I. (India) Private Ltd.:** Mr. A. Keown, Personnel Director. **I.C.I. (Pakistan) Ltd.:** Mr. F. E. Edden and

Mr. W. C. Walters, Directors. **Khewra Soda Co. Ltd.:** Mr. L. G. Reed, Director.

RETIREMENTS

Some recent announcements of senior staff retirements are: **Dyestuffs Division:** Mr. H. Harrison, Division Director and Chief Accountant, retired 31st March; Mr. W. L. Hart, Division Joint Sales Director, retired 30th April. **Head Office:** Mr. L. G. Burleigh, Transport Controller, retired 30th April. **The Regions:** Mr. A. C. Gibbons, Regional Sales Manager, Metals Department, Midland Region, retired 30th April.

OBITUARY

Captain D. J. Claris

It is with much regret that we report the death on 19th March of Captain D. J. Claris at the age of 69.

Captain Claris, who retired in 1952, joined the Central Labour Department in 1928 and will be remembered by many for his enthusiastic development of recreational activities throughout the Company. He subsequently became Labour Manager of the Paints Division.

During the war he returned to the Navy to become Director of Physical Training and then resumed work with I.C.I. in the Head Office Staff Department.



Thermal power development at Wairakei, New Zealand (see "Nature's Power House" on page 158)

EXPLOSIVES AND SOUTH AFRICA (continued from page 151)

record of what the title "armourer" involved or what munitions, if any, were actually shipped from Birmingham. Certainly Kynoch's agent in Pretoria (the capital of the South African Republic) supplied large quantities of Mauser ammunition to the South African Republic. But whether or not this ammunition was made in Birmingham by Kynoch's is not known. It could have been imported by the same firm of agents from Germany. There is thus no evidence to support a picture that one Chamberlain was supplying munitions to the Boers while the other was cognisant of the Jameson Raid and in close touch with Rhodes.

In 1907 Kynoch's decided that there was room for yet another explosives concern within the Union of South Africa. Arthur Chamberlain announced this to the Press in Durban, stating "We have decided that a Kynoch factory will be established in this country. Not only are explosives to be manufactured but possibly fertilisers and sheep dips from by-products." Two years later, in 1909, these plans became a reality and yet another explosives factory came into production at Umbogintwini, near Durban.

The ensuing five years preceding the outbreak of world war in 1914 saw intense competition between the three rival factories. Gradually the pressure of wartime shortages changed all that, and the one-time fierce rivals were led by circumstances to work together. They pooled supplies of sulphur and glycerine. They entered into price arrangements and a rough division of markets. And when in 1918 Modderfontein came under the full control of the British Nobel interests, who took over the German shareholding, and when Nobel's amalgamated with

Kynoch's a year later, the stage was set for a final fusion of the entire South African explosives industry. That decisive step took place in 1924 after the fundamentals had been agreed (not without a struggle) between Sir Harry McGowan, chairman of Nobel Industries Ltd., and Mr. Ross Frames, chairman of De Beers.

Since then there have been great strides forward. To match them, African Explosives Industries Ltd. (the original title of the company) has become African Explosives and Chemical Industries Ltd. Particularly since the war there has been a big capital expansion, and nearly £40m. of new capital has been invested.

Explosives still remain—but only just—the biggest side of the business. Close on its heels now comes the manufacture of fertilisers—chiefly superphosphate, but also fertiliser mixtures and nitrogenous fertilisers. In fact, fertiliser production is on the verge of a further new expansion, and plans are well advanced to produce over 100,000 tons a year of urea, a material which contains the highest nitrogen percentage of any solid fertiliser.

The third main facet of A.E. & C.I.'s business is production of heavy chemicals. Ammonia is now produced at Modderfontein by the same process as it is manufactured at Billingham. A wide variety of other heavy chemicals, of which the latest are chlorine and P.V.C., is also made to meet the growing requirements of an expanding South African industry. Among them are cyanide for the extraction of gold from crushed rock and nitric acid for uranium extraction.

And what of the future? It is safe to say that as South Africa grows in wealth, so A.E. & C.I. will grow too.

THE RADIOACTIVE THICKNESS GAUGE

By B. W. Neill (I.C.I. (Hyde) Ltd.)

The radioactive thickness gauge—technically called the beta-ray thickness gauge—is an ingenious instrument which, instantaneously, continuously and without touching, will record the thickness of a moving band of material like leathercloth or metal sheeting. It does this by emitting radioactive rays (beta rays) which are partially absorbed by the material being measured; the thicker the material, the greater the absorption. The amount of absorption is recorded electrically, thus showing up immediately the slightest variation in quality.

"Parva sunt haec; sed parva ista non contemnendo majores nostri maximam hanc rem fecerunt.—These are small things, but it was by not despising those small things that our ancestors accomplished this very great thing."—LIVY

IT is perhaps a liberty to quote these lines of Livy, written 2000 years ago, to introduce a modern marvel, but there is a peculiar aptness in his words to many scientific developments of the present time. The beta-ray gauge is one of them.

The gauge, which is a device for measuring the weight or thickness of materials in sheet form, owes its origin to a discovery made over sixty years ago by a Frenchman named Becquerel. He was at the time studying a compound of the element uranium, and somewhat inadvertently found that it emitted radiations which could penetrate thin sheets of paper, aluminium and so on.

This remarkable phenomenon, which came to be known as radioactivity, was very soon identified in several other elements besides uranium, and study showed that not one but three different kinds of ray were being emitted. The scientists, before they knew exactly what these were, tagged them alpha, beta and gamma rays, and it is the middle one of these which has proved to be so useful. The beta rays have, in fact, been shown to be electrons, one of the fundamental and smallest particles of which matter is composed. How small it is difficult to comprehend, but it would take about 3×10^{28} of them (i.e. 3 followed by twenty-eight noughts) to equal an ounce in weight.

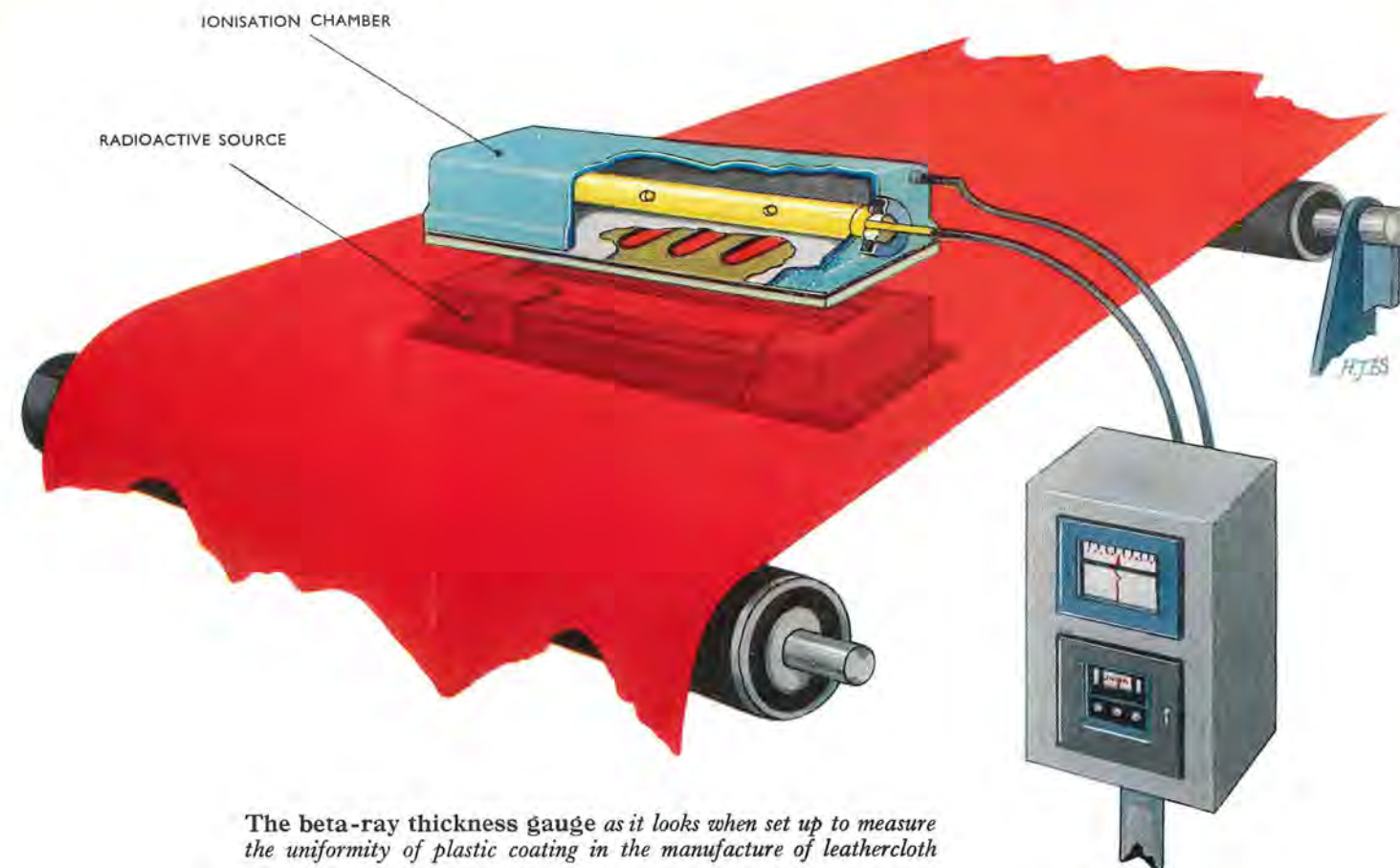
Putting the beta rays to work in a thickness gauge depends on two important properties which they possess. The first, already mentioned, is their power to penetrate thin sheets of material. Indeed, the most energetic of the rays can penetrate just over a sixteenth of an inch of aluminium. They do not, of course, in passing through such materials, retain their original strength but are absorbed to a degree dependent on the thickness of the sheet; the thicker the sheet, the greater the absorption.

There is, in fact, for any given material a definite relationship between degree of absorption and thickness. Having established this by direct measurement, it is subsequently a relatively simple matter to deduce the thickness of an unknown sample merely by measuring its absorbing effect.

The means of measuring the strength of beta rays depends on a second important property, namely their ability to ionise a gas. Normally, the atoms of which a gas is composed are electrically neutral, and it is a fact that if the gas is confined between two metal plates maintained at different voltages (polarised) no electric current flows between them. Beta rays, however, entering a volume of gas cause ionisation of its atoms, that is to say, cause them to become electrically positive or negative; in this case, if the gas is between polarised metal plates, a small current flows. The strength of this current, which can be measured, is related to the degree of ionisation of the gas, which in its turn depends on the strength of the beta rays entering the gas. A practical device in which a volume of gas is so confined between polarised metal plates is called an ionisation chamber.

The beta-ray gauge, consisting of a radioactive source emitting beta rays which can be directed through the material of unknown thickness into an ionisation chamber, was to all intents a theoretical possibility in Becquerel's day. There were reasons, however, why no practical use was made of it until after World War II.

Firstly, apart from other considerations, natural radioactive elements are extremely rare and therefore prohibitively costly; secondly, ionisation chamber currents are very tiny indeed, and special techniques based on electronic circuits have had to be developed to measure them in a way suitable for use outside the laboratory.



The beta-ray thickness gauge as it looks when set up to measure the uniformity of plastic coating in the manufacture of leathercloth

Fortunately, too, the first difficulty has been overcome with the discovery, again in France, in the 1930s that certain normally non-radioactive elements can, in fact, be made radioactive by atomic bombardment. Since the war the building of atomic piles has made possible the production of these artificial radioactive elements on a commercial scale, so that they are now available relatively cheaply and in abundant quantities.

One practical form of a beta-ray measuring head is shown in the cut-away drawing of a typical installation. The artificial radioactive source consists of a thin strip of special metal which is mounted on a thick brass block, the whole being enclosed completely in a sheet-metal case with a slot in its upper surface. This case is thick enough to prevent beta rays emerging except through the slot, and the latter too can be closed off by a retractable shutter when the source is not required. The commonly used radioactive sources for thickness gauges are thallium, strontium and cerium.

The ionisation chamber is located above and about an inch away from the source and consists primarily of a cast metal box into which, but insulated from it, protrudes a metal tube, called the collector electrode; the box and tube together constitute the polarised plates referred to earlier, and the space between them is gas-filled, usually with nitrogen slightly above atmospheric pressure. The side of the chamber facing towards the source differs from

its fellows in being in the form of a window of thin aluminium foil about two-thousandths of an inch thick supported on a series of ribs. This "window," while sufficiently strong to render the chamber gastight, as is essential, is sufficiently "transparent" to the beta rays not to prevent their entering the chamber and ionising the nitrogen. It does, of course, absorb some of the strength of the rays, but this amount can be allowed for.

Although the source and chamber together form the primary measuring means in a beta-ray gauge, the current produced by the chamber, as has been noted, is extremely small and has accordingly to be amplified before it can operate a suitable indicator or recorder. The electronic amplifier used for this purpose, while a highly specialised piece of equipment and indispensable to the gauge, need not be described here.

If the beta-ray gauge seems a rather complex means of measuring thickness, three of its particular advantages must be remembered. First, it measures thickness virtually instantaneously; second, it does so continuously; and third, above all, it does so without touching the measured material. In doing this it has provided the manufacturing industries which produce materials in sheet form—from aluminium foil to roofing felt, plastics to paper, leathercloth to glass—with a valuable new tool.

Livy was right—"by not despising small things a great thing has been accomplished."

Underworld Adventure

By David Lessels (Paints Division)

Recently the tragic death of Neil Moss made potholing front-page news. And many people have asked: what makes these potholers tick?

Colour photographs by W. P. Jeans

IN a cavern deep below the Mendip hills near Cheddar, Somerset, someone lit a magnesium coil, and in the cold, intense glare a hideous world was revealed; a hideous world, yet one which also possessed a strange, awful beauty—a world where time was petrified. Great stalactitic columns, fluted like organ-pipes and semi-transparent, cast grotesque shadows. From the ceiling, high up in the gloom, stalactites dripped the centuries away.

Illuminated too by the brief splash of light was the little group of people who had descended into the underworld. Their few, echoing remarks injected into the heavy silence were eloquent in their undertones of the cathedral atmosphere that prevailed.

There were a dozen or so people in the party. All were dressed in nondescript clothes which were sodden with brown mud. Some wore miners' hats with lamps attached. A few of them were I.C.I. personnel from Slough. They were an oddly mixed lot, ranging from a slim girl—the wife of one of the group and the only female present—to a man who, at six foot eight tall and nineteen stone weight, is surely the biggest man on the I.C.I. books.

The people were potholers, or, to give them their proper title, speleologists. I didn't know until I met

these unusual folk that their sport had such a highfalutin name and that it was not so much a sport as a science. But having accompanied them on one of their week-end jaunts I would say both "science" and "sport" are misnomers. To realise what I mean come with us on a short expedition to the earth's innards.

You change into your old clothes in a farm hayloft and walk across a few fields in drizzling rain to a clump of trees where a small stream is disappearing down a hole in the ground barely the size of a man-hole. One of the experienced cavers remarks with a casualness which nevertheless fails to hide his apprehension that there was heavy rain last night and he hopes the stream doesn't rise and flood the cave while we are down. Beside the entrance is a notice-board with the encouraging information of where the nearest telephone is in the event of an emergency.

You squeeze through the hole, ignoring the water that cascades over you, and follow the stream down. The crack in the rock is a mere few inches in some places. The going is unbelievably difficult. You slither along sideways, squeezing through holes that look impassable in the torchlight.

You wonder how the big man is managing with his



The only girl in our party examines a stalagmite

massive frame. He is showing an agility remarkable for a man of his size. That, coupled with experience, is taking him a long way. But there are places where we lesser beings can manage which are physically impossible for him.

The girl with her slim build slips through the passages like a fish. She has the nerve and stamina of Houdini, and thus equipped she sets out to prove with devastating success just how inferior the stronger sex is.

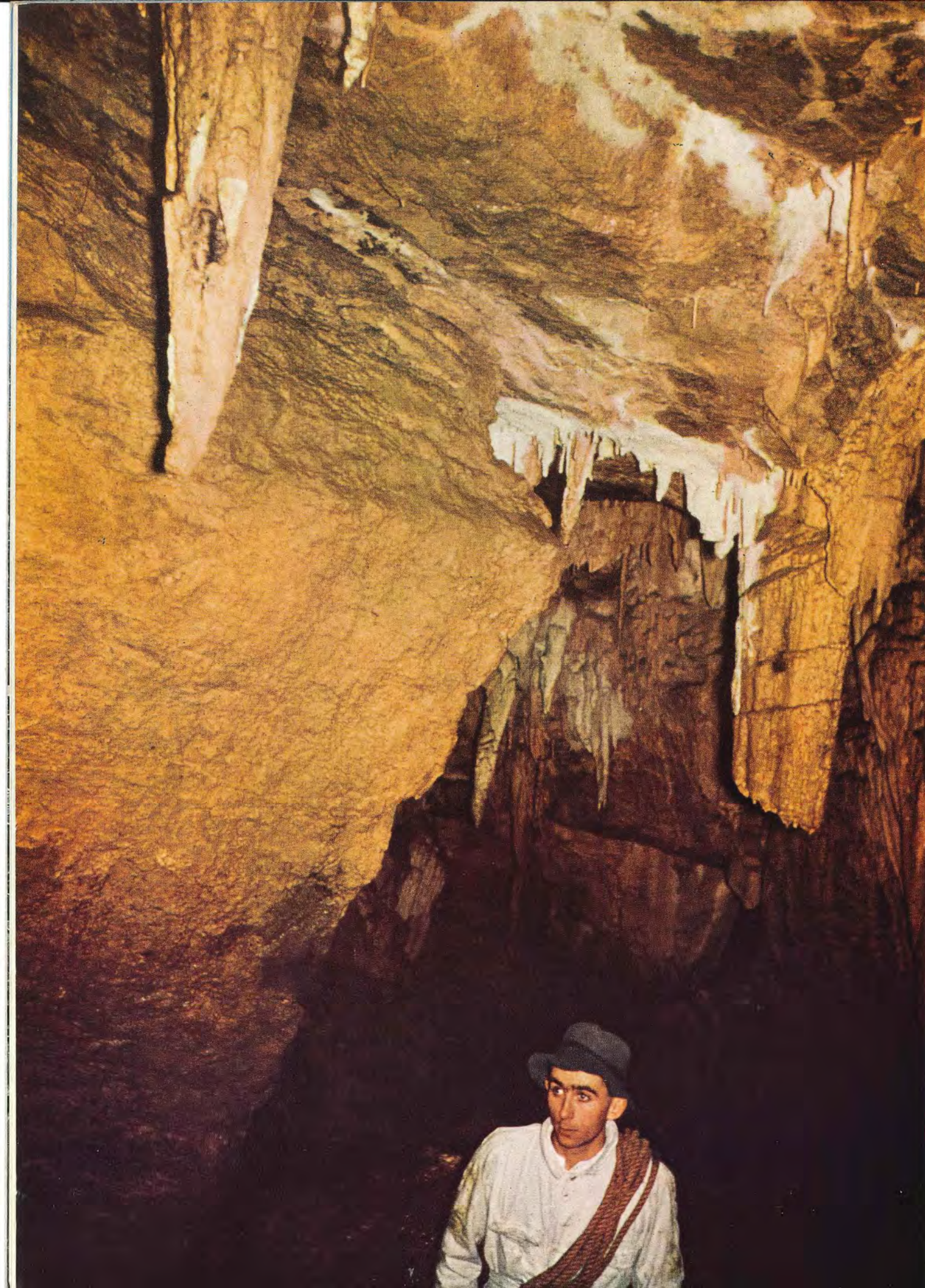
You go down, down, down, wriggling and crawling, snaking your way round S-bends, moulding your body to the curves. Soon you become adept at this. There are times when you are cut off from the rest of the party and you feel all alone and lost. And it's

dark. When your torch goes out you know darkness as you have never known it before—thick, solid blackness that clings to you.

Eventually, blissfully, you come to the cavern where you can stretch. Here are stalagmites that ring metallically when you tap them. It is said that in places where the acoustics favour echoes the lime-water drip sets up resounding unearthly music.

Over in the corner of the cavern there is a hole in the floor. You go through it and descend still further until the way narrows to a narrow tube, barely the diameter of the human body. Here is the place, famous to speleologists, known as the Drainpipe.

"Crawl with one arm out in front and one behind," says Bill, the experienced caver up in front.



A difficult descent. A potholer reaches the end of a tricky passage known as the Drainpipe.

"That way you'll narrow your shoulder width."

You wriggle into the tunnel and edge along it, all the time fighting the crushing feeling of claustrophobia that threatens to stifle you.

One fellow is stuck, and says so in a strained voice that is edged with panic. Tension rises. We know that panic could wedge him in still tighter. The situation could become serious. Bill passes encouragement to him in an over-calm voice. We wait. The man struggles. Suddenly he is free, and relief ripples along the tunnel.

Soon you are through and enter a small chamber where you can stand erect while waiting for the rest of the people to arrive. You mention to Bill that potholing can have its difficulties.

"You haven't seen nothing!" Bill assures you. "Wait till you go through a mud sump." He explains that a sump is where the entrance to a chamber is by

way of a sunken pit that is filled with water or mud. You must hold your breath while you go down and come up at the other side. Fortunately there isn't one on this expedition.

You descend more passages and pass along a tunnel that is barely a couple of feet high which is filled with water to within six inches of the roof. That isn't very comfortable. At the end the river froths in a vortex before it plunges with a roar into a deep pit.

You are soaked and cold, bruised and appalled at the thought of having to go through the whole lot again on the way back. You are convinced that you and all the rest are fools for being there.

Yes, potholing is not for the fastidious. It is the wettest, messiest and most gruesome pastime I know. Yet it has a fascination that, once sampled, draws you back. I know that I'm dying to see one of Bill's mud sumps.

In some caves you can stand upright. This photograph was taken inside the famous Sweldon Cave in Somerset, where last year a boy, although roped as in mountaineering, was killed when he slipped and fell into water.

THE I.C.I. GROUP IN 1958

How we traded during the year

	1958	1957
	£m.	£m.
Sales and other trading proceeds, income from investments, less loan and other interest	<u>465.2</u>	<u>465.5</u>
THIS WAS SPENT OR SET ASIDE AS FOLLOWS:		
Raw materials for production and maintenance, purchases for resale, and payments for external services	268.2	266.2
Wages and salaries	110.2	107.5
Pensions and contributions to pension funds ..	7.3	7.2
Depreciation of our physical assets (in order to provide funds with which to replace the assets when they reach the end of their useful lives)	29.6	24.5
Employees' profit-sharing bonus	5.4	5.0
Taxation	20.6	26.3
LEAVING A GROUP INCOME AFTER TAX USED AS FOLLOWS:		
Retained to finance further expansion	10.7	16.7
Distributed as net dividends to shareholders ..	13.2	12.1
	<u>£m.465.2</u>	<u>£m.465.5</u>

How we stood at year end

	1958	1957
	£m.	£m.
Plants, offices, vehicles and other equipment , the value of which, after deducting the amounts set aside to replace these assets when worn out, was (the 1958 figure is after the revaluation of assets)	492.4	398.2
Patents, trade marks (and in 1957 Goodwill) whose book value was6	16.9
Shares in and advances to associated companies with whom I.C.I. has mutual interests	34.6	19.1
Stocks of raw materials and manufactured products ..	113.7	122.5
Investments readily marketable and Tax Reserve Certificates	5.2	12.1
Cash at our Bankers and in hand	5.6	12.3
Owed by our customers	72.0	74.5
	<u>724.1</u>	<u>655.6</u>
Less owed to our suppliers and Bankers and set aside to meet other liabilities	105.6	110.4
Total net assets employed by the Group, therefore, amounted to	<u>£m.618.5</u>	<u>£m.545.2</u>

THE ANNUAL REPORT

I.C.I. did not do so well in 1958 as in the previous year. Group income fell from £28m. to £23m. Here are some extracts from the Annual Report throwing light on the Company's activities in the past year and on the reasons for less success.

I.C.I. sales in the home market in 1958 were slightly greater than the comparable sales in 1957. Sales of plastics, paints and leathercloth were at high levels, and in spite of bad weather there was an increase in fertiliser sales. Increasing competition in a growing number of products in the home market was met from both home and overseas suppliers. The low level of activity in the textile industries and, to a less extent, in the building, coal mining and steel industries, resulted in a reduction in sales to these consumers, and as a result of the reduced demand for military aircraft, sales of titanium were also lower.

Home sales of 'Terylene' were particularly affected by the recession in the textile industry, but shared in the general improvement of the Company's sales in the last quarter of the year.

Prices Stable, Costs Up

There were changes in prices at home for a number of I.C.I. products during 1958—some upwards and some downwards—but on balance these had little effect on total sales proceeds. In export markets prices tended to fall. There has been little change in 1958 as compared with 1957 in the total turnover of products, whether measured by volume or by value, although further new plants were commissioned.

For some years the Group has been faced with rising costs resulting from increases in wages and salaries, in transport charges, and in the prices of materials consumed. Although there were some further increases in 1958, these were on a reduced scale, and the Group benefited in 1958 from the reduced prices of some raw materials. The

increase in costs in the year 1958 is due principally to the emergence of a factor not experienced for many years, namely the operation of a number of plants at levels appreciably below their full capacity. Initial expenditure incurred in establishing production on new plants has been a further factor contributing to the higher costs in 1958.

Exports Up

Despite the general world recession, I.C.I. exports from the United Kingdom increased by nearly 2% in 1958. The total f.o.b. value amounted to £73.8m. The main feature of the year was the substantial increase in exports of plastics and 'Terylene.' There were also bigger exports of sulphate of ammonia, and overseas sales of heavy organic chemicals were encouraging.

The distribution in 1958 of the Company's exports among the various markets is shown below:

Territory	Value of Exports (f.o.b.)
	£ million
Europe	23.4
Middle East	4.0
India, Pakistan, Burma and Ceylon	9.2
Far East	7.0
Africa	8.1
North America	5.5
Central and South America	7.8
Australasia	8.8
	<hr/> 73.8

£45m. spent on Construction

Expenditure in 1958 on the Company's programme of construction in the United Kingdom was £45.3m. compared with £50.6m. in 1957. During the year further projects were authorised, of which the most important were the extension and modernisation of plant for the production of light soda ash at the Alkali Division's Lostock Works, a new plant in the General Chemicals Division for the manufacture of calcium carbide, the further development of the rock salt mine at Winsford, the extension of the methanol plant at Heysham, a new nitric acid plant at Ardeer, and a further stage in the development of the site and services at Wilton Works.

At the end of 1958 the Company's estimated future expenditure on projects already sanctioned by the Board was £49.8m., and of this amount contracts have already been entered into for £14.1m.

Research and Development Cost More

In 1958 expenditure on research amounted to £9.3m. compared with £8.5m. in 1957, and on development, including technical service, £5.7m. compared with £5.0m. in 1957.

Fewer People Employed

The number of the Company's employees in the United Kingdom (including those in H.M. Government agency factories) fell from 115,846 at the end of 1957 to 112,108 at the end of 1958, largely as a result of the transfer of some of the Company's activities to Yorkshire Imperial Metals Ltd. There was also, however, some redundancy caused by changes in the pattern of business and by mechanisation; this has occurred mainly in the Metals and Nobel Divisions, but the impact has been lessened by transfers within the Company.

In the early part of the year the Company discussed with the trade unions how best to protect employment where it was affected by reasons outside the employee's control. The Company emphasised that its first object would be to find alternative work, but if this could not be done every opportunity and help would be given to the employee to find employment elsewhere; he would be given as long a warning of redundancy as practicable and a formal period of notice of up to twelve weeks, according to his length of service. In addition, the employee would,

after discharge and while seeking other employment, receive a weekly resettlement allowance for a period of up to ten weeks, depending on his service, and if he had had ten or more years' service he would also receive an ex gratia lump sum payment.

Big Fall in Accident Rate

There was a big reduction in the accident rate during the year, and the number of lost time accidents in the Company has now fallen to 0.45 for every 100,000 man hours worked, which is roughly a man's working life.

How and why Assets were Revalued

At the Annual General Meeting last year the Chairman stated that the time had arrived for a fresh revaluation of the manufacturing assets in view of the considerable further inflation since 1950, when the previous revaluation was made, and that these new values would be incorporated in the Accounts for 1958. This further revaluation was carried out as at 1st January 1958 in respect of the physical assets in the United Kingdom of the manufacturing Divisions and of those wholly owned subsidiary companies in this country which fall within the general supervision of manufacturing Divisions, using substantially the same principles as those used in 1950.

Briefly, an estimate was made of what it would cost to erect the plants or otherwise replace their productive capacity at 1st January 1958, and this gave a figure of gross value. This gross value was then reduced to take into account the expired life of the assets and the current estimate of their future working lives, due allowance being given to the technical or commercial factors likely to influence future use of the assets. It is this reduced figure which has been incorporated in the Balance Sheet.

The increase in the depreciation charge for 1958 arising from the revaluation is somewhat less than might have been expected because in the reassessment of the lives of existing plants many were considered to have a longer economic life than was previously estimated.

Goodwill written off

The Directors have decided that, in a year in which the manufacturing assets have been revalued, it is prudent to take the opportunity to write off the intangible asset Goodwill.

NEWS IN PICTURES — Home and Overseas



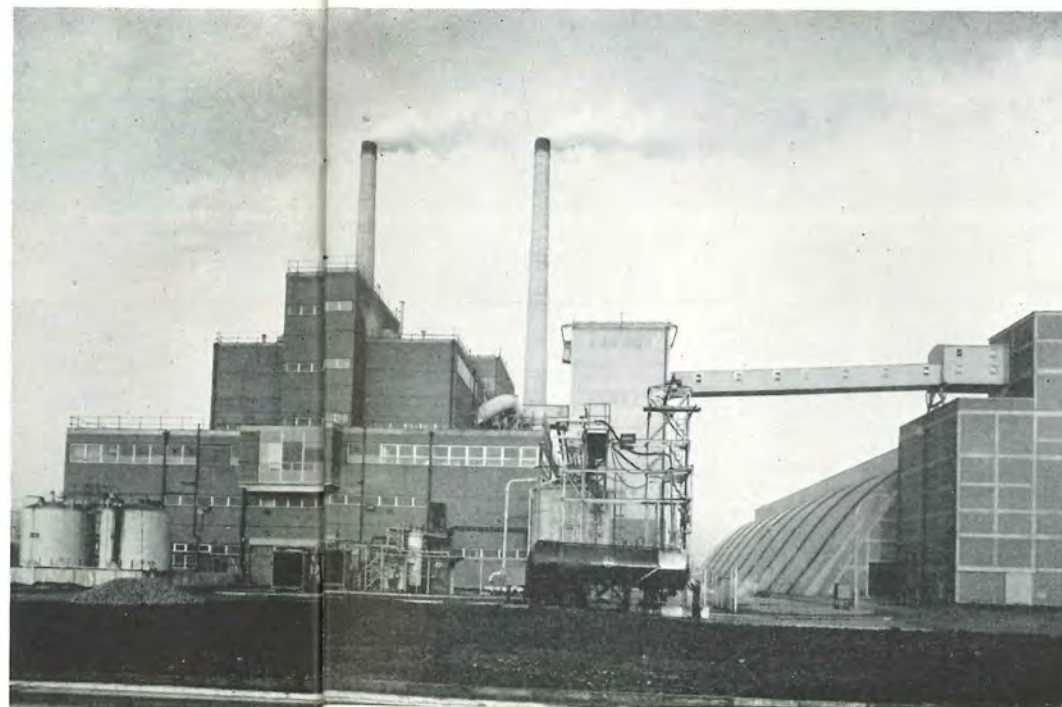
Nylon airhouse. This inflatable airhouse, which resembles a giant igloo, is made of nylon coated with p.v.c. The nylon is made at Wilton Works and spun at Pontypool by British Nylon Spinners, the company jointly owned by I.C.I. and Courtaulds. Put on the market by the Gourrock Ropework Co., it is 40 ft. in diameter and takes just ten minutes to erect. 'Terylene' is also a candidate for the airhouse



New fertilizer plant. One of the main showpieces when Billingham Factory entertained over 400 of its fertilizer agents last month was the new 'C.C.F.' plant. It is the largest in Britain and one of the largest of its kind in the world. Our photographs, taken by Maurice Broomfield, show (left) a general view of the granulation plant and storage silo and (above) the interior of the silo. 'C.C.F.' (Concentrated Complete Fertilizer) is one of four main types of fertilizer produced at Billingham. Total production of all fertilizers at Billingham is over a million tons a year



Putting a lid on it. Tarslag Ltd., a well-known firm of British contractors, beat the bad weather by covering an unfinished building project with a cocoon of 'Visqueen' polythene film. This made round-the-clock work possible, and the project, the control room of a new power station in North-east England, was then completed three months ahead of schedule. The total amount of film, made by British Visqueen Ltd. (an I.C.I. subsidiary company), was 400,000 cu. ft.—the largest cover of its kind ever erected in Britain





New offices in Johannesburg. An architect's impression of I.C.I. (South Africa) Ltd.'s new Head Office building in Johannesburg due to be opened early this month by Mr. E. A. Bingen (Overseas Director). Designed by a Johannesburg firm of architects in collaboration with I.C.I. Architectural Section, it is a combined warehouse and office building with underground garage space. I.C.I. (South Africa) is mainly a selling organisation for I.C.I. products but also manufactures 'Lightning' fasteners and 'Alfloc' water treatment briquettes



Mr. Walter Hall of Elliott Works, Metals Division, is one of four brothers who all worked for the Company (three of them were awarded the 40 years' service clock). Mr. Hall is proud to have achieved the family record by reaching the 50 years' service milestone a month before his retirement in April at 65



Wheelwright retires. Billingham Division's last and only wheelwright, Mr. Ralph Walker, has recently retired. Throughout his 23 years with Billingham he has been responsible for repairing all wooden-wheeled handcarts and sack barrows there. At 71 Mr. Walker was one of the few remaining wheelwrights in the country of this centuries-old, now dying craft



Easter Parade. Mr. G. Goodridge (Treasurer's Dept.) (left) and Mr. K. Moss (Far East Dept.) were two of a dozen Head Office men who may have been spotted when the Easter Parade in Hyde Park was televised on Easter Day. Mr. Ralph Reader, the well-known TV personality, who organised the parade for the British Travel and Holidays Association, had called for volunteers to act as escorts to these charming models



Mr. Peter Moll (Metals Division Work Study Dept.), a Reservist Major in the Special Air Service Regiment, has just returned from his 23rd post-war service trip to Scandinavia. In our photograph he is standing next to Major General Dahlberg, who is seen addressing a group of British Special Air Service troops. These men are selected volunteers who are thoroughly trained in such skills as parachuting, canoeing, ski-ing and demolition work



St. Thomas's Church. The new church (left) was built to serve the needs of all the Christian Protestant community in Magadi and was recently consecrated by the Bishop of Mombasa. During the service (below) Mr. J. F. Perkins, General Manager of the Magadi Soda Co. Ltd., presented a cope and mitre to the Bishop. The church was built to designs prepared by the Architectural Section of I.C.I. Engineering Services Department



Language barrier. Competition in foreign markets makes it important that technical and commercial staff visiting customers should be able to talk the others' language. Here a class run by Fibres Division for their technical service staff is seen studying German with the help of gramophone records, and perhaps dreaming of the day they will go off on a technical service visit to Germany



Marston's and modernisation. Marston Excelsior Ltd. has supplied light alloy radiators and oil coolers for the 22 Deltic diesel-electric locomotives being made by the English Electric Co. for British Railways. The 3300 h.p. Deltics, one of which is seen here, are the most powerful single-unit diesel-electric locomotives in the world

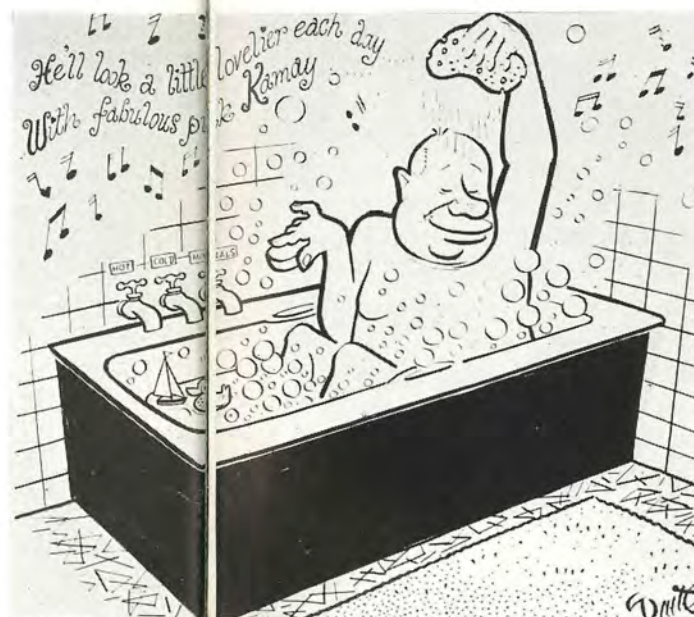


Lisbon gift. The manager, Mr. W. C. Collett of I.C.I. (Export) Ltd., Lisbon branch, on behalf of the staff there, presents Mr. F. G. Tanner with a silver cigarette case on his recent retirement from the Company as head of European Department

Science v. Classics. Sir Alexander Fleck, Chairman of I.C.I., took part recently in a joint debate between the Royal Institute of Chemistry, the Classical Society and the Haldane Group held in London University's Senate House. The motion was "that the education of our future rulers should be primarily in the sciences rather than in the humanities." On the platform with Sir Alexander are Sir Cyril Hinshelwood, president of the Royal Society, Professor Farrington and Professor Beare. Science suffered an unexpected reverse



China toasts. A farewell dinner was given recently by the directors of I.C.I. (China) Ltd. on the retirement of the chairman, Mr. R. J. Sheppard, after 29 years' service. During the evening members of the China staff received long service awards. With Mr. Sheppard (second from left) are (l. to r.) Mr. Tom Shew-Tong (20 years), Mr. Cheung Man (27 years), Mr. Chan Siu-Yok (20 years), Mr. Lai Pui-Lam (27 years) and Mr. Wong Wing-Suen (20 years)



Krushchev's choice. Following the news that Mr. Krushchev had admired a light blue bath made of 'Perspex' exhibited on the I.C.I. stand at Leipzig Trade Fair and had accepted it as a gift, the "Daily Sketch" ran this cartoon on the subject

Titanium at Thameshaven. One way of preventing corrosion by sea water is to apply the technique of cathodic protection. The latest trend is to use anodes made of I.C.I. titanium with a very thin coating of platinum. This 15,000 sq. ft. steel jetty is protected by four titanium anodes (shown inset), only 2 ft. x $\frac{3}{8}$ in.



Week-end in New York. Yes, it is possible if you have £300 to spare or if, like Miss Mavis Holmes, senior receptionist at Fibres Division headquarters, you are lucky enough to be invited to fly on the inaugural trip from Manchester to New York of the German airline Lufthansa. Miss Holmes was chosen because an important part of her work includes arranging air journeys for the Division's staff. She was presented with a complete wardrobe of 'Terylene' clothing, and is pictured here packing for the journey. During the trip, which lasted three days, she visited many well-known places, including the Empire State Building

The Job I didn't Get

By John Cunningham (Nobel Division)

In a recent issue John Gough described his job of helping to select candidates for I.C.I. Here is the other side of the picture—the agonies of the aspirant.

Illustrated by Mervyn Wilson

I DON'T know why it is, but I invariably arrive too early for anything which I am particularly dreading. On this occasion I was sitting bolt upright on the edge of an armchair in a beautifully furnished outer office waiting to be interviewed for a job. I was so worried about keeping the knife-edge creases in my trousers that I had scarcely moved a muscle for about a quarter of an hour except, from time to time, to polish the toes of my shoes on the backs of my socks. "Relax!" I told myself. "There is nothing to get alarmed about. All you have to do is relax."

I pulled out a cigarette and lit it as nonchalantly as I could. I had taken two or three long nerve-steadying puffs at it before I realised I already had a lit cigarette in my other hand. I decided there and then that it was not a very good job anyway and that my talents would have been absolutely wasted on it. I was on my feet making for the outside door when the other door to the inner room opened and I was invited to go in.

The room was large and high. At the far end there was a long highly polished table, and behind it five distinguished-looking gentlemen were watching me closely. I had the feeling that they were all hoping against hope that I would slip on the linoleum or trip over the carpet.

The chairman of the panel welcomed me enthusias-

tically and said how good it was of me to give up my time like this to come along and see them. I gathered that my presence was the one thing these five had been looking forward to for weeks. This attempt to make me feel at ease failed completely. I only grinned foolishly and said that it was quite all right as I really was not doing anything else anyway.

I was introduced to the rest of the panel and invited to sit down in a chair across the table from them. I still admire the cunning that went into the design and positioning of that chair. It had a broad, hard seat, a straight back and high arms. If you sat back in it you were lounging; if you sat on the edge, as I did, the arms held your elbows into your sides and your hands were left somewhere about your knees, looking enormous and out of place.

The chair had been placed so near the table that it was almost impossible to squeeze into it. As it was, I stood on the chairman's toes in my attempt. From the eagerness with which all this was observed I realised the chair had been a test of initiative. I should have pulled it back, sat down easily and adopted a comfortable, relaxed position. I could no more have done that than I could remember the names of the panel to whom I had been introduced a few minutes earlier.

We talked about the weather for a bit and agreed it had been very wet recently. They told me the latest Test Match score and argued among themselves about the team, and I assured them that I had had a comfortable journey down.

The chairman offered round cigarettes, which we all took except the gentleman on the extreme right, who asked me if I minded if he smoked his pipe. I graciously gave my consent, and after some trouble he got it going and retired into a cloud of evil-smelling blue-green smoke.

By this time I was in difficulties with my own cigarette. There was no ashtray anywhere within my reach and I could not think what to do with the ash. Eventually I had to flick it into my left hand and transfer it stealthily to my jacket pocket. That was bad enough, but when I had finished the cigarette I had to get rid of the stub. By the time it had burned down to about a quarter of an inch from the end and I could just hold it and no more, I was desperate. I had made up my mind that the only thing to do was to swallow it when one of the panel, obviously more kind-hearted than the others, pushed his own ashtray over to me.

My memory of what was said at the interview, what questions were asked and what I said about myself, are vague. At one point, I know, the gentleman with the pipe emerged from his cloud, leaned forward, gave me a hard, searching look and said: "Tell me, Wilson, why weren't you President of the Union when you were up at Cambridge?" When I told him I was not Wilson and had not been at Cambridge he looked terribly hurt. He retired behind his smoke-screen and afterwards maintained a dignified silence.

They asked me why I particularly wanted to join their company and were obviously not impressed when the only valid reason I appeared to have was that all the others had turned me down so far. There were some embarrassing moments, too, when I could not remember the name of a single book I had read in the last two years and the only composer I could think of, despite my avowed interest in classical music, was Cole Porter. The panel were as surprised as I was to learn that the play which had most impressed me was *Peter Pan*.

Towards the end of the interview for some reason or other (probably because I realised what a mess I had made of it and that any hope I had of the job had vanished completely) I became aggressively overconfident. I treated the panel to a homily on the evils of



big business. I gave them my views on what was wrong with the political situation and how to put it right. I even pointed out where the Test Selectors had made some inexcusable mistakes.

It was at this stage, too, when we were discussing my interests and hobbies that I remember stating that I was passionately interested in beagling, stock car racing, polo, falconry and eighteenth-century chamber music.

They were glad to get rid of me in the end, and my exit set the seal to the whole interview. We shook hands again and I strode swiftly and confidently to the door, pulled it open, and stepped briskly into a cupboard full of cleaners' mops and pails. When I finally reached the proper door I hardly needed to open it—I could have crawled underneath quite comfortably.

The Village Umpire

By Robin Todhunter

Illustrated by Edgar Ainsworth

HIS name was Frank, his figure spare and slightly bowed with age. After a lifetime spent in the open his face was the colour of a farmhouse floor, hatched with innumerable wrinkles. It was split by a tomahawk of a nose from which hung ivory handlebars, drooped to their tobacco-stained tips.

He seldom spoke, but there was never any doubt about his views. On returning to the pavilion after our usual uninspired showing he would settle in his corner for tea. His pale rheumy eyes would range over us, licking out here and there like a viper's tongue.

In the Queen's Head after the match he would sometimes unbend with his third pint. Meditatively sucking froth off the handlebars, he would tell us tales of the past when men were really men. Alas, the records of sixty years ago had long disappeared and all his fellow players of that age were dead, so we had no documentary proof to submit to Wisden; but they must have been great days. M.C.C. and county sides were apparently mown down like ninepins, and one of the demon bowler's thunderbolts once passed through an oilskin coat and killed a sheep on the boundary. Late in the evening Frank could almost be persuaded that he had carted Sydney Barnes over the village church half a mile away. But then a look of suspicion would cloud his face. Slowly he would lower his head. He would rise and leave us to our indecent merriment.

Now a man of his age must economise in mental effort as well as physical. A young man may squander his boundless mental energy on a multitude of small decisions, choosing the tie he will wear, deciding where he would like to sit, and whether he will go out or not. As we grow old we avoid this effort. We

wear always the same tie, we sit in the same place, we never go out.

So it was with Frank and his umpiring. Long past were the days of careful balancing of pro and con. He had stripped the flesh of argument from the bones of decision. Life had been reduced to one basic principle. If we were batting, no appeal had the remotest prospect of success. If "they" were batting, he would lean forward, elbow on knee, trigger finger ready cocked to be slowly raised at the first whisper of an appeal.

This at times led to friction, as on the occasion when we were playing our rivals in the next village. "They" were in, and Frank already had two nice l.b.w.s to his credit, so there was thunder in the air when the opening bowler was taken off and Frank's son Cecil was put on to bowl.

Cecil bowled slow right-arm tweakers round the wicket, and although it was difficult to predict just where they would pitch, their behaviour on pitching was always surprising. He could spin them like a croupier spins a roulette ball. In flight the ball hummed like an angry bluebottle and on landing it would buck off at right angles like a tennis ball from the tambour. It would often escape both wicket-keeper and slips and spin off past backward point to the boundary.

Two more wickets had fallen during the previous over, and the match, after a sticky start, was beginning to run our way. Cecil's second ball was a beauty. A full pitch to leg, nicely judged to tempt the batsman to hit it down long leg's throat, where it was safely gathered amidst thunderous applause. His next ball zipped off to third man and they ran a bye. His fourth ball pitched somewhere in the region of square leg but came back viciously and struck the batsman a



sharp blow in the kidneys. To our astonishment we saw Frank's minatory finger slowly raised, although no one had appealed. Before he had time to realise that this was perhaps somewhat unorthodox, Cecil turned round, saw his father's finger and automatically said "How's that?" "Out" said Frank instantly, whereupon pandemonium broke loose. Our opponents poured out of the pavilion in fighting mood. Frank, nothing daunted, rolled up his sleeves. The handlebars stood out horizontally as if to impale his

nearest adversary, and it was only with the greatest difficulty that calm was restored. We did our utmost to persuade the batsman to return and Frank to resume umpiring, but it was all in vain; the game was abandoned and Frank never stood for us again.

He died a year or so later. In his last moments his eyes opened and a faint smile flickered over his face. With difficulty he raised one finger from the bedcover before it fell back inert and lifeless.

He had been given out at last.



"The Lunch Break"

Photo by Anthony Lynn (Wilton Works)